Syllabus for Materials Processing, MSNE 302
Rice University spring 2022 start date is January 10, 2022

1. Instructor: Dr. Randy C John
   - office is in the MSNE department office on the second floor of George R Brown Hall
   - email is johnrandy14@yahoo.com or randy.john@rice.edu
   - cell phone is 281-620-3998
   - Course will begin 100% online for two weeks and transition to face to face, as announced by Rice administration on December 26, 2021. Dr. John can be reached by phone or email. Good times for phone calls are 12:30 - 3:00 p.m. Mondays, Wednesdays and Fridays.
2. Class will meet online at 11:00 – 11:55 p.m. on Mondays, Wednesdays and Fridays. An alternate or extra class day/time may be announced with class participation and will be used in the event class is not held on a scheduled day (except for days affected by University-wide cancellation of classes). If Dr. John cannot attend a regularly scheduled class meeting, an alternate will be scheduled.
3. Students are welcome to visit with Dr John. Discussions on course contents or career issues are welcome.
4. Course objectives for the students are to learn the basics of the sciences of materials processing and to become familiar with applications in industries. Topics to be discussed include awareness and understanding of the following:
   - Introduction and Overview of Manufacturing
   - Fundamentals of Metal Casting
   - Metal Casting Processes
   - Glass Working
   - Shaping Processes for Plastics
   - Processing of Polymer Matrix Composites and Rubber
   - Powder Metallurgy
   - Processing of Ceramics and Cermets
   - Fundamentals of Metal Forming
   - Bulk Deformation Processes In Metal Working
   - Sheet Metalworking
   - Theory of Metal Machining
   - Machining Operations and Machine Tools
   - Cutting-Tool Technology
   - Grinding and Other Abrasive Processes
   - Nontraditional Machining and Thermal Cutting Processes
   - Heat Treatment of Metals
   - Surface Processing Operations
   - Fundamentals of Welding
   - Welding Processes
   - Brazing, Soldering, and Adhesive Bonding
   - Additive Manufacturing

- Processing of Integrated Circuits
- Electronics Assembly and Packaging
- Microfabrication Technologies
- Nanofabrication Technologies

Homework assignments and the due dates are in the course schedule. All submitted materials will be neat and will be submitted at the beginning of the class of the date indicated in the schedule. Multiple sheets will be submitted together. Paper size 8.5 x 11.0 inches is required for homework. Homework should be scanned, put into a single file and emailed to Dr. John. Late work will not be graded, unless approval for late submission is given before the homework is due.

Expected learning outcomes for the student are to learn the vocabulary and analysis tools to define the key aspects of a materials processing situation, to recommend a course of action for analysis and to suggest a plan for implementation.

5. Grade policies
   - All materials to be graded should be presented to the instructor on the due date.
   - Homework materials should be submitted no later than the beginning of class time of the due date announced. Exam materials will be submitted at the end of the class period.
6. Absence policy
   - Students are expected to attend all classes.
   - Regular attendance and productive/positive class participation may influence final course grades. Not all materials presented are found in the textbook.
7. Required textbook

   Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 6th Edition by Mikell P. Groover, ISBN: 978-1-119-12879-3 November 2015, 944 Pages
   Amazon link: Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 6th Edition, Groover, Mikell P., eBook - Amazon.com
8. Special materials required for the class
   - none
9. Required examinations and papers
   - Final exam will be a comprehensive exam and will be 20% of the course grade.
   - Three midterm course exams will be in class and each will be 20% of the course grade. Exams will be in class and may be long. Check for commitments at end of class.
   - Homework items from each chapter discussed in the course and submitted at beginning of the date indicated in the course schedule and will be 20% of the course grade. Course schedule is attached below as a table.
10. Statement of expectations regarding course work and the Rice Honor Code
    - Homework assignments may be done in collaboration with student colleagues
    - Cell phones and electronic communication devices will be switched off during class time.
    - Exams in class time will be individual efforts, shall not involve collaboration with students and may not include use of any resources not approved

- All course work should be of high quality in presentation and information contained; should indicate the assignment; should show the logical assessment of the problem statement, the analysis done, the final conclusion/recommendations; and full reference citations of all background/source materials used in the effort.
- Materials submitted for course requirements will be neat, orderly, complete, well prepared and submitted on the required date, unless alternate arrangements were made before the due date.
- Survey of course/instructor performance will be done at course mid-point.
- The Rice honor code shall apply.

11. Any student with a disability that requires accommodation should contact both the course instructor and Disability Support Services in the Allen Center.
12. Information contained in this course syllabus, other than the absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor and announced to the students.
13. Students needing special accommodations to due physical limitations are encouraged to communicate this need to the instructor as soon the need becomes known to the student. The intent is to comply with the ADA statute.
14. Chapters in the textbook should be read in advance of the lectures.
15. About 2 hours of personal study/homework time will be needed for each hour in class.

To address ABET student outcomes and program criteria, the students will have

(a) An ability to apply knowledge of knowledge of mathematics, science and engineering
(b) An ability to identify, formulate and solve engineering problems

The curriculum will prepare graduates to apply advanced science (such as chemistry, biology and physics), computational techniques and engineering principles to materials systems implied by the program modifier, e.g. ceramics, polymers, biomaterials, composites materials. The subject materials specific to this course will be materials processing science and the application of these principles to materials engineering materials principles in industrial applications. Graded student materials will demonstrate completion of the above requirements.

MSNE 302 Materials Processing Course Schedule for Spring 2022 (1/31/2022)

Class Date	TABLE OF CONTENTS	Homework Review Questions	Homework Problems	Homework due date	Course Grade Weight
1/10	1 Introduction and Overview of Manufacturing	3,8,12,23	1,5,9,12	1/19	
1/12	10 Fundamentals of Metal Casting	1,2,6,9,14	1,11,17	1/19	
1/14 & 19	11 Metal Casting Processes	1,7-11	2,6,12,17	1/24	
1/21	12 Glassworking	1,2,5,7,9,12	none	1/24	
1/24 & 26	13 Shaping Processes For Plastics	1,3,14,16,31	1,8,14,17,20	1/31	
1/28	14 Processing of Polymer Matrix Composites and Rubber	1,9,11-14	none	1/31	
1/31	15 Powder Metallurgy	1,4,6,9,14,19	1,6,8,11,13	2/4	
2/2	16 Processing of Ceramics and Cermets	1,7,8,15,16	none	2/4	
2/4	see Canvas file examples of processes in chapters 1, 10-16				
2/7	midterm exam 1				20%
2/9	17 Fundamentals of Metal Forming	1-3,7,11,13	1,11,13,	2/14	
2/14 & 16	18 Bulk Deformation Processes In Metal Working	1,4,9,12,18,23,	3,10,13,25,31	2/21	
2/18 & 21	19 Sheet Metalworking	1,4,5,8,14,18,19	1,5,7,12,14,17	2/21	
2/23	20 Theory of Metal Machining	1,4,6,15,17	1,9,14,22,25	2/28	
2/25 & 28	21 Machining Operations and Machine Tools	3,7,15,23	1,6,8,12,19	3/7	
3/2	22 Cutting-Tool Technology	1,2,4,6,9,10, 22	1, 7, 15, 19, 21	3/7	
3/4	24 Grinding and Other Abrasive Processes	2-4,7,8,12	2, 11, 13	3/11	
3/7	25 Nontraditional Machining and Thermal Cutting	2, 3-7	2, 4, 6, 7,11,14	3/11	
3/9	26 Heat Treatment of Metals	1-6,11, 12,13,14,17	none	3/11	
3/11	27 Surface Processing Operations	3,5,11,15,17,18,20	none	3/21	
3/12 - 20	*spring break*				
3/21	video examples of processes in chapters 17 - 22, 24-27				
3/23	midterm exam 2				20%
3/25	28 Fundamentals of Welding	1,4-7,15,18	1,2,5,7,9, 14	3/28	
3/28 & 30	29 Welding Processes	1,2,8-11, 26-28	1,4,10,13,16	4/4	
4/1	30 Brazing, Soldering, and Adhesive Bonding	1-3,6,7,18,19,21	none	4/4	
4/4	32 Additive Manufacturing	2,7-10	2,6,7	4/11	
4/6	33 Processing of Integrated Circuits	1-6,10,21	1,4, 9,13, 15	4/11	
4/8	34 Electronics Assembly and Packaging	1,4,5,7,8,16,17	none	4/11	
4/11	35 Microfabrication Technologies	1,2,5,6,8	none	4/18	
4/13	36 Nanofabrication Technologies	1,3,4-7,9,10,11,15,16	none	4/18	
4/15	video examples of processes in chapters 28-30, 32-36				
4/18	extra day				
4/20	midterm exam 3				20%
4/22	wrap-up				
				homework =	20%
				final exam =	20%
			sum of components of course grade =		100%